#### **Tetanus and Tetanus Toxoid**

**Epidemiology and Prevention of Vaccine- Preventable Diseases** 

National Center for Immunization and Respiratory Diseases
Centers for Disease Control and Prevention

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#### **Note to presenters:**

Images of vaccine-preventable diseases are available from the Immunization Action Coalition website at <a href="http://www.vaccineinformation.org/photos/index.asp">http://www.vaccineinformation.org/photos/index.asp</a>

#### **Tetanus**

- First described by Hippocrates
- Etiology discovered in 1884 by Carle and Rattone
- Passive immunization used for treatment and prophylaxis during World War I
- Tetanus toxoid first widely used during World War II

#### Clostridium tetani

- Anaerobic gram-positive, spore-forming bacteria
- Spores found in soil, animal feces; may persist for months to years
- Multiple toxins produced with growth of bacteria
- Tetanospasmin estimated human lethal dose= 2.5 ng/kg

## **Tetanus Pathogenesis**

- Anaerobic conditions allow germination of spores and production of toxins
- Toxin binds in central nervous system
- Interferes with neurotransmitter release to block inhibitor impulses
- Leads to unopposed muscle contraction and spasm

#### **Tetanus Clinical Features**

- Incubation period; 8 days (range, 3-21 days)
- Three clinical forms: local (not common), cephalic (rare), generalized (most common)
- Generalized tetanus: descending symptoms of trismus (lockjaw), difficulty swallowing, muscle rigidity, spasms
- Spasms continue for 3-4 weeks
- Complete recovery may take months

#### **Neonatal Tetanus**

- Generalized tetanus in newborn infant
- Infant born without protective passive immunity
- Estimated more than 250,000 deaths worldwide in 2000-2003\*

## **Tetanus Complications**

- Laryngospasm
- Fractures
- Hypertension
- Nosocomial infections
- Pulmonary embolism
- Aspiration pneumonia
- Death

## **Tetanus Wound Management**

	Clean, minor wounds		All other wounds	
Vaccination History	TD*	TIG	TD*	TIG
Unknown or less than 3 doses	Yes	No	Yes	No
3 or more doses	No <sup>+</sup>	No	No**	No

<sup>\*</sup> Tdap may be substituted for Td if the person has not previously received Tdap and is 10 years or older

<sup>+</sup> Yes, if more than 10 years since last dose

<sup>\*\*</sup> Yes, if more than 5 years since last dose

#### **Tetanus Epidemiology**

Reservoir
Soil and intestine of

animals and humans

Transmission Contaminated wounds

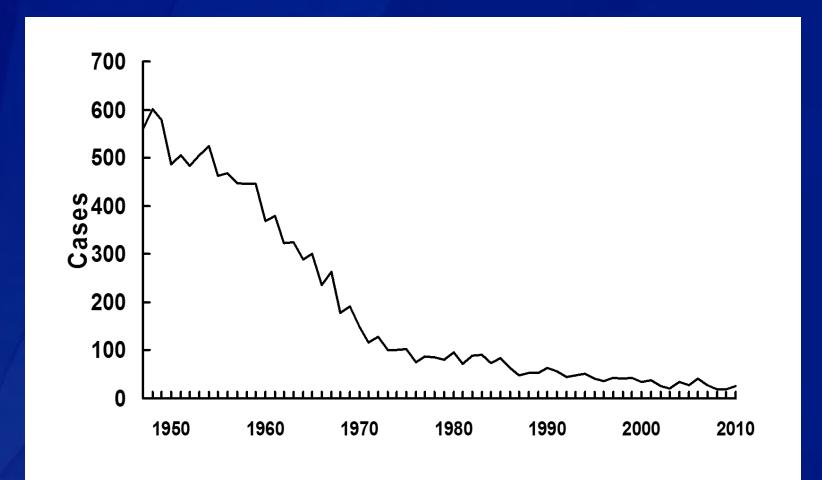
**Tissue injury** 

Temporal pattern
Peak in summer or

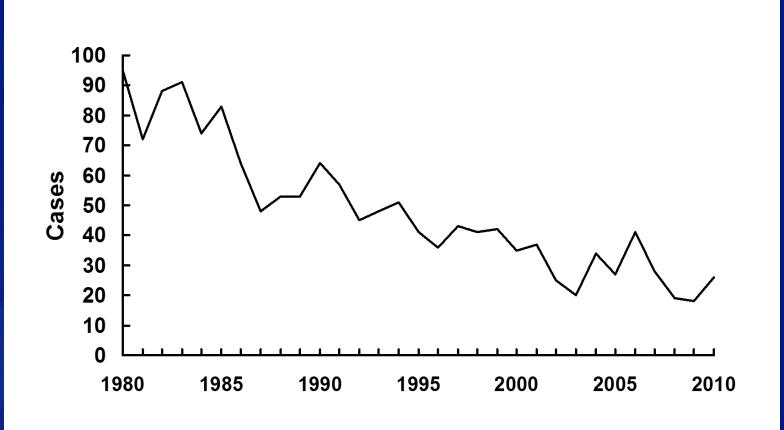
wet season

Communicability
Not contagious

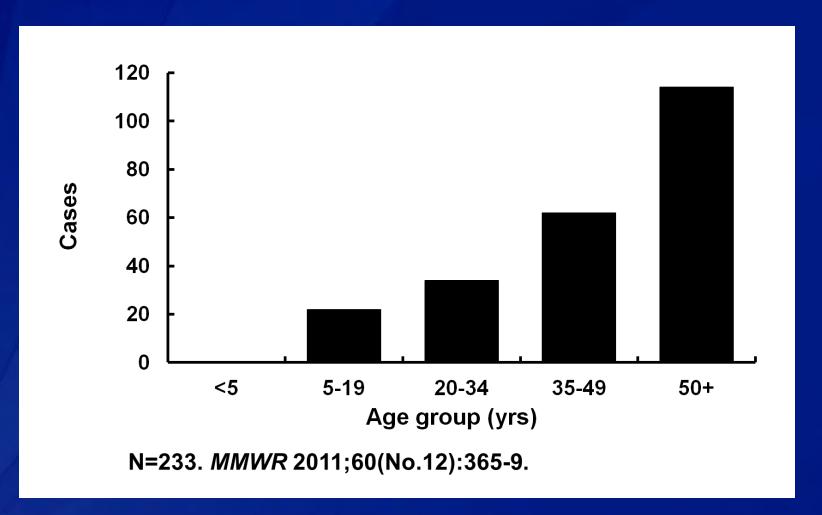
## **Tetanus—United States, 1947-2010**



## **Tetanus—United States, 1980-2010**



# Tetanus—United States, 2001-2008\* Age Distribution



#### **Tetanus – United States, 2001-2008**

- Total of 233 cases was reported (average of 29 cases per year)
- Case-fatality rate 13%
- Median age 49 years (range 5 to 94 years)
- 49% were among persons 50 years of age or older
- Incidence similar by race
- Incidence among Hispanics was almost twice that among non-Hispanics
  - when intravenous drug users were excluded the incidence was almost the same among Hispanics compared with non-Hispanics

#### **Tetanus – United States, 2001-2008**

- 15% were reported to have diabetes
- 15% were intravenous drug users
- 72% reported an acute wound (e.g. puncture or contaminated, infected, or devitalized wound)
- 13% reported a chronic wound or infection before disease onset, including diabetic ulcers and dental abscesses

## DTaP, DT, and Td

	Diphtheria	Tetanus
DTaP, DT	7-8 Lf units	5-12.5 Lf units
7-8 Lf units Tdap (adult)	2-2.5 Lf units	5 Lf units

DTaP and pediatric DT used through age 6 years. Adult Td for persons 7 years and older. Tdap for persons 10 years and older (Boostrix) or 11 through 64 years (Adacel)

#### **Tetanus Toxoid**

Formalin-inactivated tetanus toxin

Schedule Three or four doses + booster

**Booster every 10 years** 

Efficacy Approximately 100%

Duration Approximately 10 years

 Should be administered with diphtheria toxoid as DTaP, DT, Td, or Tdap

# Routine DTaP Primary Vaccination Schedule

Dose	Age	Interval
Primary 1	2 months	
Primary 2	4 months	4 wks
Primary 3	6 months	4 wks
Primary 4	15-18 months	6 months

#### **Children Who Receive DT**

- The number of doses of DT needed to complete the series depends on the child's age at the first dose:
  - if first dose given at younger than 12 months of age, 4 doses are recommended
  - if first dose given at 12 months or older, 3 doses complete the primary series

## Tetanus, Diphtheria and Pertussis Booster Doses

- 4 through 6 years of age, before entering school (DTaP)
- 11 or 12 years of age (Tdap)
- Every 10 years thereafter (Td)

# Routine Td Schedule Unvaccinated Persons 7 Years of Age or Older

Dose*	Interval
Primary 1	
Primary 2	4 wks
Primary 3	6 to 12 mos

Booster dose every 10 years

\*ACIP recommends that one of these doses (preferably the first) be administered as Tdap

## Diphtheria and Tetanus Toxoids Contraindications and Precautions

- Severe allergic reaction to vaccine component or following a prior dose
- Moderate or severe acute illness

## Diphtheria and Tetanus Toxoids Adverse Reactions

- Local reactions (erythema, induration)
- Exaggerated local reactions (Arthus-type)
- Fever and systemic symptoms not common
- Severe systemic reactions rare

#### **CDC Vaccines and Immunization**

**Contact Information** 

Telephone 800.CDC.INFO

Email nipinfo@cdc.gov

Website www.cdc.gov/vaccines

